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Apparatus Replacement in the Greeneville (TN) Fire Department: Acquiring Needed Equipment During Difficult Economic Times

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Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: _____

Abstract

The issue of apparatus replacement was investigated. This was accomplished using the descriptive method of research and resulted from the lack of a planned apparatus replacement schedule for the Greeneville Fire Department. The purpose of this study was to determine the best approach to replace aging non-compliant apparatus in the Greeneville Fire Department. This was accomplished by analyzing the works of others related to apparatus replacement and by evaluating approaches that other fire departments take regarding apparatus replacement. Three research questions were answered during this study regarding standards and statutes related to fire apparatus, options of replacing apparatus, and fire department's approaches to planned apparatus replacement. The results of the research revealed that there are no ordinances or statutes related to apparatus replacement but that national standards exist, that the majority of fire departments have apparatus replacement plans, and the majority of fire departments replace apparatus based on the age of the apparatus. The author recommended that the Greeneville Fire Department adopt a comprehensive apparatus replacement plan, that the plan be adopted in a short time frame, that the plan comply with NFPA 1901, and offered specific options regarding the replacement of existing apparatus.

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Introduction

State and Local governments all over the United States have experienced varying levels of financial crisis over the last couple of years. The Town of Greeneville has been in a similar situation during the same time frame. Decreasing sales tax revenues and loss of employment, due to businesses and industry going out of business, have had a significant negative effect on the Town's budget and operating and reserve account balances. In the past the Town has purchased major capital items such as fire trucks from its reserve accounts. Those accounts are at dangerously low levels and large capital purchases have not been funded for the last three years. The Town has not purchased a fire truck since 1999 and does not have any type of replacement schedule for fire apparatus. The problem that this research will address is the lack of a planned replacement schedule for fire apparatus in the Greeneville Fire Department.

The purpose of this research will be to determine the best approach to replace aging non-compliant apparatus in the Greeneville Fire Department.

The research method for this study is the descriptive research method. The approach will be to research applicable laws and standards relating to fire apparatus. Research how other fire departments determine when replacement is needed. Conduct research to determine if there is a common method to determine when replacement is needed.

The research questions are:

1. What standards or statutes exist regarding the need for replacement of apparatus?
2. What are the options regarding replacement of apparatus?
3. What are fire department's approaches to planned apparatus replacement?

Background and Significance

Greeneville is a city in Northeast Tennessee which is rich in history that encompasses approximately 15.74 square miles in size with a current population of 15,274. The most significant source of employment is in the manufacturing industry; several industrial parks and large plants lie within the city limits of Greeneville. The next leading areas of employment are healthcare and education. The Greeneville Fire Department is comprised of forty-two (42) full-time paid personnel. The department currently has three personnel assigned to administrative positions, which includes the Chief, Administrative Captain, and Fire Marshal. Thirty-nine personnel are assigned to Operations on a 24/48 shift schedule. The department has four stations and six apparatus including four front-line and two reserve apparatus.

The age of the current fleet and type of apparatus in the fleet are of significant concern to the Greeneville Fire Department. The front-line fleet consists of two Quint apparatus and two Engine apparatus. Engine 2, which is the oldest vehicle of the front-line apparatus, is a 1988 Pierce Dash custom chassis engine and has 76,305 miles. This apparatus does not have a fully enclosed cab, as the rear of the cab is open, and has lap belts with no shoulder restraints. Engine 1, the next oldest of the front-line apparatus, is a 1992 Pierce Lance custom chassis quint with 41,930 miles. This apparatus does have a fully-enclosed cab and is equipped with three-point seat belts. Engine 3 is a 1997 Pierce Dash custom chassis quint with 65,327 miles and has a fully-enclosed cab with three-point seat belts. Engine 4 is a 1999 Pierce International commercial chassis engine with 31,997 miles and has a fully-enclosed cab with three-point seat belts. Reserve Engine 1 is a 1986 Ford commercial chassis engine with 59,616 miles. Reserve Engine 2 is a 1985

Ford commercial chassis engine with 31,501 miles. Both of the reserve apparatus do not have a rear cab area and can seat a maximum of three firefighters. These apparatus have lap belt only seat belts and do not provide shoulder restraints. The average manufactured age of the fleet is 1991 or nearly twenty years of age with the oldest apparatus being twenty-five years old and the newest apparatus being eleven years old. A chart of the current Greeneville Fire Department apparatus is included in Appendix A. A concern with the type of apparatus is the fact that the reserve apparatus can only seat three firefighters and the seating configuration of the reserve apparatus hampers operations at emergency scenes. The three firefighters are seated side by side in the front cab of the trucks. Another concern is the lack of proper passenger restraint devices in three of the six apparatus and the implications on firefighter safety as a result.

The Town of Greeneville has never had a fire apparatus replacement schedule or plan to facilitate the replacement of fire apparatus. The Town does not have a replacement fund and have not set aside funding specifically for the purpose of capital purchases including fire apparatus. A comprehensive fire protection management study reviewed the apparatus and issued recommendations regarding replacement. (West, 2005) West recommended that the Town replace at least one engine and that future replacement should be a planned process at regular intervals. (West, 2005) Decreasing revenues over the past several years have not allowed for the above recommendations to be followed. In fact the expenditure budget of the Town has been reduced over the past four years, including an 11.5 % decrease of the fire department's operating budget.

The Town is now in the position, because of age and type of apparatus, of needing to replace multiple apparatus. The economic crisis of the last couple of years has left

multiple other capital projects unfunded or underfunded as well. This creates the situation of the Town having to prioritize what projects will be funded and creates competition among projects that need to be funded. The influencing, negotiation, and persuasion content of the Executive Leadership course are critical to solving the problem of not having an apparatus replacement schedule.

The prior impact of the lack of an apparatus replacement schedule is that the Town has not been allocating funding for the replacement of apparatus. At present the lack of a replacement schedule is having a negative impact on the budget and operations of the fire department. Budget impacts are related to increased maintenance costs and decreased fuel efficiency. Operational impacts are due to safety of the current apparatus and decreased operational efficiencies based on apparatus type and configuration. The future impact of not having a replacement schedule is the most concerning. If apparatus are not replaced maintenance costs will continue to increase and apparatus will ultimately wear-out and fail. Failure of apparatus could result in loss of life or property. Safety innovations and recommendations for apparatus will continue to be developed and having old, obsolete apparatus will significantly increase the risks to firefighters. This is an escalating issue and addressing it relates to the United States Fire Administration operational objective; to respond appropriately in a timely manner to emerging issues.

Literature Review

A literature review was done for this project which addresses the problem of the lack of an apparatus replacement schedule. The review was accomplished by exploring Applied Research Projects from the National Fire Academy (NFA), fire service related journals, fire service related books, and fire service related reports and standards.

The literature review will analyze the works of others related to apparatus replacement schedules and three related research questions. The analysis of the research questions will include what standards or statutes exist regarding the replacement of apparatus, what are the options regarding replacement of apparatus, and what are fire department's approaches to planned apparatus replacement?

Why should fire departments develop an apparatus replacement schedule, why not drive the apparatus till it is worn out and then purchase a new one? The answers to the questions are multi-faceted. The economic situation around the country has resulted in decreased budgets and many capital projects have been put on hold. It should come as no surprise that fire departments are included in the review for possible budget cuts, especially fire apparatus capital projects. (Shand & Wilbur, 2010) This creates a situation where fire departments are utilizing apparatus that need to be replaced or are behind on their replacement schedules. Fire departments must have defensible reasons for replacing apparatus and the reason should be measured against a definable cost. (Hill, 2008)

Making decisions about when to replace apparatus are difficult ones. Fire service apparatus are extremely expensive to replace. (Compton & Granito, 2009) "Fire departments are finding that traditional time frames for apparatus replacement are not meeting the needs of the modern fire service." (Upham, 2007) Many fire departments schedule their fleet upgrades but this falls far short of having a comprehensive fleet replacement plan. (Hill, 2008) Advantages of a comprehensive fleet replacement plan are as follows: standardization of equipment and hose lays, simplifies driver training and operations, costs of apparatus can be amortized over a time period, new technology and safety innovations are introduced more rapidly into the fleet. (Shand & Wilbur, 2008)

Comprehensive fleet replacement plans include the schedule, capital costs, operating costs, and future costs. Future costs estimate the cost to replace an apparatus at its replacement interval and includes manufacturers price increases. (Hill, 2008) Firefighter safety should be the primary consideration when developing apparatus replacement schedules; this includes evaluating the safety innovations that new apparatus offer. (Compton & Granito, 2009) Many safety features are now available that were not offered on older apparatus including: extensive cab crash testing, firefighters seated in enclosed cabs with seat belts, occupant protection systems, equipment located in cab securely mounted, air horns and siren locations, slip resistant steps and standing surfaces, step and ground illumination, reflective striping, and enhanced warning lights and sirens. (Cavette, 2006)

Regarding the question of what standards or statutes exist, a review of both local and states codes and ordinances reveal that codes regarding the replacement of apparatus do not exist. ("Tennessee Code," 2010) Cooper (2002) states: “no national standard exist that specifically mandate when you must replace your apparatus”. Although there are no local, state, or federal laws or mandates on the Greeneville Fire Department to replace apparatus, nationally recognized standards do exist. The National Fire Protection Administration (NFPA) publishes NFPA 1901: Standard for Automotive Fire Apparatus; which is updated every three years. (Lyon, 2010) Through its safety upgrades NFPA 1901 has improved firefighter safety over the years, often standard changes are based on the committee’s awareness of an ongoing apparatus safety issue. (Peters, 2010)

NFPA 1901 presents particular requirements or standards related to the construction and operation of fire service apparatus. (NFPA, 2009) Many apparatus

safety innovations have been introduced through NFPA 1901 including: fully enclosed riding compartments with seats and seat belts for all members-1991; enhanced warning lighting and secondary braking devices-1996; antilock brakes, improved steps and handrails-1999; hose bed restraints-2003; cab strength requirements, seat belt warning devices, electronic roll stability, and speed restrictions-2009. (Peters, 2010)

In addition to the above mentioned safety related standards NFPA 1901 also provides guidelines related to apparatus replacement. Annex D of NFPA 1901 states "Because of the changes, upgrades, and fine tuning to NFPA 1901, Standard for Automotive Fire Apparatus, have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to fire fighters of keeping fire apparatus older than 15 years in first-line service. (NFPA, 2009) The standard also recommends that apparatus not manufactured to these standards or that are older than 25 years should be replaced. (NFPA, 2009)

Regarding the question of what are the options for apparatus replacement a multitude of options exist. Shand and Wilbur (2010) offer recommendations on refurbishing apparatus and purchasing used apparatus. Their recommendations regarding this type of upgrade or purchase include ensuring that the department can meet NFPA standards with the upgrade or purchase. Refurbishing apparatus usually means remounting the body onto a new chassis, replacing the engine and either recertifying or replacing the pump. Another option for fleet replacement is the consideration of stock or demonstration apparatus. (Coleman, 2010) Whether the apparatus is refurbished, purchased new, or purchased used the cost is significant and there are many options regarding how to fund the purchase. Various funding mechanisms that exist are operating

budget, capital purchases, lease-purchase arrangements, leasing, and sinking (replacement) funds. (Compton & Granito, 2009) Many municipalities are looking at ways to spread out paying for apparatus over multiple years and are opting for lease purchase or straight lease plans. (Shand & Wilbur, 2010) Reduced maintenance costs are another reason that many municipalities are opting to have a newer apparatus fleet utilizing annual lease payments. (Shand & Wilbur, 2008)

Regarding the question of what are fire department's approaches to planned apparatus replacement, there are a variety answers provided in the literature review. Team approaches to apparatus replacement are being utilized; many times in the past apparatus committees were formed. Now the suggestion is to take this to a new level and to form a planning team that looks at not just what apparatus to purchase but what the department needs, and how to fund it. (Rinaldi, 2010) Drake (2005) found while assessing his department's fleet that fire apparatus greater than 8 years old start to have maintenance costs increases averaging 20% per year. He notes that the days of holding on to apparatus 25 years or longer are gone and recommends an aggressive schedule of replacement for his department. (Drake, 2005) Upham (2007), through his research on apparatus replacement, found that traditional 15 to 20 year replacement schedules are being amended to 8 to 12 year cycles. He has recommended a replacement schedule of 10 years for Engines and 12 years for Ladders. Scott Cooper (2002) found through his research that multiple factors should be used in determining the apparatus replacement schedule not just age. The guideline that he recommended for his department addresses mileage, age, obsolescence, and maintenance costs. (Cooper, 2002)

This literature review examined apparatus replacement and three research questions that included what standards or statutes exist regarding the replacement of apparatus, what are the options regarding replacement of apparatus, and what are fire department's approaches to planned apparatus replacement? The literature review revealed that apparatus replacement schedules are necessary for multiple reasons including budget justifications, efficiency of newer apparatus, and safety enhancement on newer apparatus. Another finding of the literature review is that although there are no statutory requirements to replace apparatus, standards exist regarding apparatus replacement and center around firefighter safety and reliability of the apparatus. Because of the economic situation departments are looking at refurbished, used, demonstration, or stock apparatus purchases as options for replacements, other options include purchase options such as lease, lease purchase, bonds, etc. Departmental approaches to planned apparatus replacement were also examined and included team approaches, financing options, and specified replacement time frames. The literature review provided a plethora of information regarding apparatus replacement and has had a significant positive impact on this project.

Procedures

The procedures applied to this research were a literature review, and an online survey. The literature review includes sources such as applied research projects, books, fire service trade magazine publications, and national standards. The survey concerned how fire departments replace their fire apparatus. This survey addresses questions related to how many departments have replacement schedules, are the replacement schedules based on statutes or standards, what indexes are used to determine when to replace

apparatus, funding of replacement apparatus, and how departments dispose of their replaced apparatus. The survey consists of nine questions; a copy of this survey is included in Appendix B.

This survey was posted on the internet site surveymonkey.com for a period of approximately four weeks. An e-mail with a link to this survey was sent to numerous chief fire officers from across the country and numerous fire chiefs in the state of Tennessee. The link to the survey was sent to approximately two-hundred fifty e-mail addresses with forty-five respondents.

Limitations of this survey primarily relate to the return rate of the survey. The survey received an approximate twenty percent return rate. An unforeseen limitation to the survey is the respondent's mixing of some of the questions together. The author attempted to separate the indices used to determine replacement but some respondents combined the indices.

Definition of Terms:

Engine Apparatus- fire apparatus with a permanently mounted pump with a capacity of at least 750 gallons per minute, water tank, hose body whose primary purpose is to combat structural and associated fires.

NFA- National Fire Academy

NFPA- National Fire Protection Association

Quint Apparatus- fire apparatus with a permanently mounted pump, water tank, a hose storage area, an aerial ladder or elevating platform with permanent waterway, and a complement of ground ladders.

USFA- United States Fire Administration

Results

The results of research question one reveal that no statutes or ordinances exist regarding the replacement of fire apparatus. In fact thirty-one out of forty-four (70.0%) respondents answered “No” to the question is the scheduled replacement of apparatus based on a standard or statute. Two respondents (4.5%) did answer “Yes, based on Local Statute, Ordinance, or Code” but their written responses reveal that they are based simply on a locally developed guideline and that the commission must vote on the replacement. One respondent (2.3%) answered “Yes, based on State Statute, or Code” but again the written response reveals that replacement was based on a State Fire Bureau rating and failure to replace within a specific time frame resulted in a loss of points on the fire protection rating. Standards for apparatus replacement are followed, both from local and state requirements as listed above as well as NFPA standards. Eight respondents (18.2%) answered “Yes, based on NFPA 1901” and another three respondents (6.8%) answered “Yes, based on ISO or other fire service related statute”. Although they answered that their replacement schedule was based a standard or statute, two of the respondents wrote that the replacement hinged more on funding than the replacement scheduled or standards.

Exploring research question two on the options for apparatus replacement revealed that while most departments follow similar plans for replacement some departments utilize very unique criteria and methods for replacement. The most commonly utilized methods for determining replacement are age and mileage. In fact, thirty-three out of forty-five respondents (73.3%) answered that replacement was based on age. Eleven respondents (24.4%) answered either that the replacement schedule was

not based on a specific measurable index or was based on an index other than age or mileage. Regarding options for the time of replacement several of the written comments mentioned formulas or criteria that take several apparatus and vehicle parameters into account. The criteria that was listed in the written comments includes service records, maintenance costs, idle hours, condition, mileage, age, technology needs, current function, and number of breakdowns. Several options were also revealed regarding the way that vehicles are purchased. Most respondents answered that they use conventional types of funding mechanisms, nineteen out of forty-five (42.2%) purchase with capital funds from a specific replacement fund and thirteen out of forty-five (28.9%) purchase with capital funds form an existing fund balance. Five of the respondents (11.1%) utilize either a lease purchase or a lease turn-in to fund apparatus replacement. Eight of the respondents (17.8%) answered other and the written comments related to this offered bond issuance or a combination of bonds, reserve funds, and leasing. Some interesting responses to this question were that one city utilizes bond process but purchases bulk capital items using the bond such as fire trucks, police cars, front-end loaders, etc.; another respondent answered that grant funds are used to purchase apparatus. There was no mention from the respondents about refurbishing apparatus or purchasing used, demonstration, or stock apparatus.

Research question three asks: “What are fire department’s approaches to planned apparatus replacement?” Most departments answered that they have a specific plan or schedule for the replacement of apparatus, in fact thirty-seven (82.2%) out of forty-five respondents utilized a replacement plan or schedule. The index that most departments use is age of the apparatus; thirty-three out (73.3%) out of forty-five respondents utilize this

method of replacement. One respondent (2.2%) utilizes mileage as the factor for apparatus replacement. The other respondents replied that they do not use an index or use another type of index. As mentioned in the results of research question two, several departments are using multiple factors to determine replacement schedules. Most of the written responses related to mileage were referring to command or staff vehicles and not apparatus.

The vast majority of respondents stated that they use age as a determining factor for replacement of apparatus. The survey resulted in thirty-five written comments about age based replacement; eleven of those written comments did not disclose a specific age of replacement. The remaining twenty-four responses gave age specific data regarding engine and quint replacement. The author has excluded ladder apparatus and specialty apparatus because the Greeneville Fire Department utilizes engine and quint type apparatus. The average age of replacement for engines and quints utilizing the responses is 15.54 years, with the high being twenty-five years and the low being seven (one response for each). The responses reveal that eight replace at fifteen years, seven at twenty years, four at ten years, two at twelve years, and one at seventeen years. The results were based on replacement of the apparatus and include years spent in front-line and reserve status. A few of the departments indicate that they rotate apparatus from front-line to reserve to keep mileage and wear consistent over the fleet.

The results of the survey reveal that while most departments have some type of an apparatus replacement schedule and that most do not base their replacement on a statute or standard. It also reveals that regardless of whether departments use a replacement plan or not or base replacement on standards or statutes or not the majority replace apparatus

based on the age of the apparatus. A copy of the survey questions and results are included in Appendix B.

Discussion

Through both the literature review and the research it is obvious that statutes or ordinances related to apparatus do not exist. (Cooper, 2002; "Tennessee Code," 2010) The findings of both what others have published as well as the research indicate that standards exist regarding the replacement of apparatus but the use of the standards is not supported by the research. The National Fire Protection Association has published and continues to update standards regarding fire apparatus. (NFPA, 2009) These standards and the revisions to them have significantly improved firefighter safety over the last several years. (Peters, 2010) Although this is the case less than twenty percent of respondents indicated that they utilize the NFPA standards for apparatus replacement.

The research and literature review indicate that departments are utilizing multiple forms of procurement procedures as options to purchase apparatus. (Compton & Granito, 2009) Although this is the case it appears that less municipalities (11.1%) are actually using lease purchase or leases to acquire apparatus than recommended by the authors in the literature review. (Shand & Wilbur, 2008, 2010) Refurbishment of existing apparatus, or purchasing used, stock, or demonstration apparatus was never mentioned in the research but was presented as an option in the literature review. (Coleman, 2010; Shand & Wilbur, 2010)

The evaluation of what are department’s approaches to replacement revealed a direct correlation of the literature review and the research. Through both the literature review and research it is evident that age is the primary factor regarding apparatus

replacement. (Cooper, 2002; Drake, 2005; Upham, 2007) The research revealed that seventy-three percent of respondents utilize age as the determining factor for apparatus replacement.

Apparatus replacement plans are being utilized by most departments (82.2%) and with good reason, departments need to be able to justify the apparatus replacement against definable costs. (Hill, 2008) Both aspects of this research, analyzing the works of others and the use of the survey have benefited this research project. The research indicates that most departments utilize a replacement schedule, do not utilize statutes or standards, and most often use age as a determining factor for apparatus replacement. Conversely, the analysis of the works of others reveals that standards should be utilized due to the enhanced safety to firefighters and the reliability of apparatus. The review however does agree with the research in that replacement plans are the rule not the exception and that age is still the largest determining factor for replacement.

The lack of an apparatus replacement plan has huge organizational implications to the Greeneville Fire Department. As revealed in the research the use of apparatus replacement plans are not only recommended but utilized by most departments. These plans have major advantages regarding safety, operational efficiencies, standardization, and costs reduction. (Shand & Wilbur, 2008) While some may argue that overall cost reduction would be the biggest factor, the safety upgrades offered by the new apparatus provide the largest organizational impact.

Recommendations

The Greeneville Fire Department does not have an apparatus replacement plan and has not purchased a fire apparatus in more than eleven years. Budget restraints over

the last couple of years have precluded the Town of Greeneville from purchasing apparatus for the fire department. This has resulted in the fire department having old, obsolete apparatus that does not meet NFPA standards and do not have many of the safety features that newer apparatus have. (Cavette, 2006) While multiple options exist for the replacement of apparatus including refurbishment, purchasing used, purchasing stock or demonstration apparatus, leasing, bond issuance, apparatus replacement funds, etc.; the lack of an apparatus replacement plan hampers the ability to adequately acquire and fund new apparatus. The following recommendations are based on the preceding research:

The Greeneville Fire Department needs to formally adopt a comprehensive apparatus replacement policy. The adoption of the plan should be accomplished within a short time frame (three to six months) and distributed to all stakeholders of this plan. The plan should include a replacement schedule, potential funding mechanisms, and future cost estimates for apparatus. The plan should also monitor current and future apparatus related to mileage, hours used, routine and ongoing maintenance, repair costs, hours of aerial operation, and obtainable NFPA related safety upgrades. The apparatus replacement plan should be evaluated and amended on a routine basis and should attempt to meet NFPA 1901. This will ensure that firefighter safety is the priority of the plan and that the apparatus being purchased or refurbished are safe and efficient apparatus.

The adoption of this plan should also facilitate the replacement of the current fleet which is detailed is Appendix A. Due to the lack of a current apparatus replacement fund the acquisition of the apparatus should be accomplished through low interest financing utilizing bond issuance or lease purchase arrangements. The following are

recommendations or options for the replacement of the current fleet based on the preceding research:

1. Replace four of the six apparatus in the current fleet during fiscal year 2011/2012. This would place the two newest current apparatus (Engine 3 and 4) in reserve and would remove the remaining non-compliant apparatus from the fleet. All of the apparatus to be removed from the fleet are in excess of the recommended fifteen year in front-line service time frame. All apparatus in front-line service would be fully compliant with NFPA 1901 immediately and that fact would stay consistent for fifteen years. The acquisition would be accomplished through either a bond issuance or lease-purchase arrangement and would encompass ten years for repayment of the acquisition. At the ten year point the fleet would be evaluated to determine if two, three, or four new apparatus would be purchased at that point. The apparatus to be removed would be sold in a manner that financially benefits the Town of Greeneville the greatest.
2. Replace two of the current apparatus during fiscal year 2011/2012 and move current Engine 1 and 2 to reserve status. All front-line apparatus would be NFPA 1901 compliant for two years and three of the four would be compliant for four years. This acquisition would be accomplished through either a bond issuance or a lease-purchase arrangement and would encompass five years for repayment of the acquisition. At the five year point two additional apparatus would be acquired and the remaining existing apparatus (Current Engine 3 and 4) would be removed from front-line service and placed in the reserve fleet. This again would make all front-line apparatus in compliance with NFPA 1901 and would be accomplished

using a similar five year bond or lease-purchase arrangement. Current Engine 1 and 2 would be removed from the fleet at this point. At the ten year point in the plan two additional apparatus would be acquired and all remaining current apparatus (Engine 3 and 4) would be removed from the fleet. This plan would follow the previous five year bond or lease-purchase arrangement. At the fifteen year point in this plan the purchases of the apparatus could be extended to a seven year time frame which would, following the second cycle of replacements, allow each apparatus fourteen years of front-line service and seven years in reserve for a complete service life of twenty-one years. The justification for doing an initial five year replacement, as opposed to seven, is the age and non-compliant status of the current fleet.

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Appendix A

Name	Make	Model	Mileage
Engine 1	Pierce Custom	1992	41930
Engine 2	Pierce Custom	1988	76,305
Engine 3	Pierce Custom	1997	65,327
Engine 4	Pierce Commercial	1999	31,997
Reserve Engine 1	Pierce Commercial	1985	59,616
Reserve Engine 2	Pierce Commercial	1986	31,501

Appendix B

1. Does your department have a specific plan or schedule for the replacement of fire apparatus?

Response Percent	Response Count
Yes 82.2%	**37**
No 17.8%	8

answered question 45
skipped question 0

2. Is the scheduled replacement of apparatus based on a standard or statute?

Response Percent	Response Count
No 70.5%	**31**
Yes, based on State Statute, or Code 2.3%	1
Yes, based on Local Statute, Ordinance, or Code 4.5%	2
Yes, based on NFPA 1901 18.2%	8
Yes, based on ISO or other fire service related statute 6.8%	3

If Yes for any answer other than NFPA 1901, please list standard or statute and reference if possible 9

answered question 44
skipped question 1

3. Are apparatus replaced on specific measurable index such as mileage, age, or other?

Response Percent	Response Count
No 13.3%	6
Yes, based on age of apparatus 73.3%	**33**
Yes, based on mileage of apparatus 2.2%	1
Yes, based on other index 11.1%	5

answered question 45
skipped question 0

4. If the apparatus are replaced based on age please comment on how replacement is scheduled. (I.E.: years in front-line service, years in reserve, differences for Engines or Ladders, etc.)

Response Count 35
answered question 35
skipped question 10

5. If apparatus are replaced based on mileage please explain parameters for replacement.

Response Count 8
answered question 8
skipped question 37

6. If you replace apparatus using a method other than age or mileage please explain the method.

Response Count 9
answered question 9
skipped question 36

7. How are the new apparatus funded?

Response Percent	Response Count
Capital purchase using an existing fund balance 28.9%	13
Capital purchase using specific apparatus replacement fund 42.2%	**19**
Lease purchase 8.9%	4
Lease turn-in 2.2%	1
Fundraising 0.0%	0
Other 17.8%	8
Other (please specify)	10
answered question 45	
skipped question 0	

8. How do you dispose of apparatus once they have been replaced?

Response	Percent	Response Count
Trade-in on new apparatus	29.3%	12
Sell apparatus to dealer or Manufacturer	14.6%	6
Sell through local auction	**36.6%**	**15**
Sell through on-line auction	34.1%	14
Donate to other departments, or other organizations	29.3%	12
Comments		13
answered question 41		
skipped question 4		

2. Is the scheduled replacement of apparatus based on a standard or statute?

If Yes for any answer other than NFPA 1901, please list standard or statute and reference if possible

1 Departmental replacement schedule pending funding of city commission

2 We like to change out our engines every 10 years and our trucks every 15 years. Due to the economy at this time, we are changing our engines out at 12 years but still changing the trucks at 15.

3 Agency Equipment Replacement Program

4 Just our local guidelines, which consider ISO, NFPA, serviceability (availability of parts) and of course how well the apparatus is aging.

5 Our standard practice is to attempt to replace vehicles based on the requirements of NFPA 1901 but, in reality we replace them based on our fiscal abilities which means we replace them as we can.

6 We replace more from a cost of ownership and return on investment perspective. We think our future plans will mirror our recent habits which include: replacing pumpers every 10 years with new. Refurbishing tractor drawn aerials for a total life cycle of 20 years. Re-chassising ambulance bodies for a total life cycle of 20 years and generally replacing specialty rigs every 15 years with late model used when possible.

7 Agreement between department and city

8 Apparatus replacement is based upon MS State Fire Rating Bureau requirements. Custom apparatus must be replaced every 15 years and 20 years for commercial apparatus. For out-of-date apparatus, the department loses fire protection points that may result in a higher fire protection rating.

9 Replacement figured by Fire Chief and city auditor. The time frame is set soon after purchase.

4. If the apparatus are replaced based on age please comment on how

Response Text

1 We try to replace our front line pumper every ten years, we are currently in the process of replacing that apparatus.

2 Based on number of years of service.

3 10 years front line, 5 years reserve for both engines and aerials, plus combined with mileage

4 Tenders - 25
Engines - 20
Ladders - 25

5 We used to have a 15 yr truck replacement plan for both ladders and engines but with new chemicals being added to road salt for our snowy environment (Minnesota) it has increased the corrosion and has been rusting our frame rails much faster, or that's the theory from our mechanics staff. We are now down to 12 yr replacement with additional undercoating and frame rail protection both in and out and in-between the frame stiffeners if the truck specs call for one.

6 DoD Fire Apparatus is typically replaced based on age of apparatus with extenuating factors that include 1 contracted rebuild. DoD Fire Apparatus (depending upon type (ARFF or Structural) have expected life-span(s) (ARFF 8 yrs & Structural 15 yrs).

7 10 years in front-line service, 10 years as reserve. Same for Ladders & Engines

8 7 years

9 Engines and water tenders: 20 years front line service and as needed in reserve Status No aerial ladders.

10 Truck-10 years front line + 5 years reserve.
Engine- 8 years front line + 4 years reserve.
HazMat unit 10 year lifespan.
Rescue Unit 10 years front line + 5 years reserve.
Command Vehicles- 50,000 miles or 5 years front line + 2 years reserve.

11 As we can afford to replace them.

12 age, then millage

13 Its actually a combination of your selections above. We try to change out the

pumper fleet in its entirety to assure standardization. We utilize "new" spares that is we buy 8 front line engines and 2 identical spares. The rotate through the fleet and mileage, hours and usage are more or less identical. 10 years appears to be a balance for us usage wise and technology wise as well. Quints are purchased new and in the same fashion. Ambulances will be purchased the same way once all the units have been re chassised. Specialty rigs and Tractor drawn aerial are more of a "feel" of life cycle, technology gap and cost of ownership.

14 Years in "front-line" service

15 15 years front line, however, they may be rotated out to slower stations at 7-10 years. Ladder is first generation for our department. New in 2008.

16 Years in front line service

17 every 10 years

18 20 years of service.

19 Age is a part of the judgment that determines the reliable ability of the vehicle at its current assigned mission. In today's economy having equations that are arbitrary create a potential for waste. Most non-metro communities are not in a position to have anything less than high value. This does not mean apparatus are not replaced, it means we need a critical eye on our expenditures while assuring reliable function.

20 Historically ten years front line, five years in reserve, however we are transitioning to maintenance cost as an additional criteria to potentially extend the ten years to one to ?? years longer.

21 The age (15 years) of the apparatus applies to both engine and ladder apparatus. For reserve apparatus, age is not a factor since no points are deducted. Several of our reserve apparatus are 30 + years. For municipalities experiencing budget problems, the MS Rating Bureau has granted extensions for apparatus (do not deduct any points for 2 to 3 years). There is a growing movement that the life of the apparatus should be based upon performance rather than age (municipal leaders). As long as the apparatus passes the annual pump service test, it is allowed to remain in service with no rating point deductions. This situation would result in departments operating from 30 to 40 year old apparatus.

22 20 yrs front line, 5 yrs reserve-same for engines and ladders

23 Years of front line service and years of reserve service

24 all of the above, mileage, service, repairs and there is a difference between type of apparatus.

25 Ambulances are quickest to get replaced usually based on wear and tear and miles... each turnover in about 3 years.
Engines are about every 10 years on average looking at our fleet and Ladders are 15 ish.

26 9 years for Medics (2.5 in Front Line, 6.5 in rotating reserve)
10-12 years for Engines
15 to 20 years for Aerials

27 20 years , 10 years front line, 10 years reserve

28 Engine are 15 years front line --5 years reserve
Ladders and Tenders- 20 years -- Can be front line or reserve

29 years front-line apparatus service

30 Replacement based on cost of repairs and time out of service versus cost of replacement.

31 15 front line with 5 year reserve. We are hoping to move to a 12 front line and 5 reserve. The years were determined by a depreciation scale developed by our fleet.

32 Front line Engines or Quints 15 year
Ladder 20 year

33 15 years for engines and 20 years for aerials.

34 Years in front-line service

35 First line, 12 years, with 5 in reserve.

5. If apparatus are replaced based on mileage please explain parameters for

Response Text

1 75000 miles

2 Command and Staff vehicles: attempt to replace at 75,000 miles. The vehicle still has some decent cash value and isn't unsafe for emergency services at 75,000.

3 Command Vehicles- 50,000 miles or 5 years front line + 2 years reserve. Oct 18, 2010 4:10 PM

4 n/a

5 This is also part of the equation along with engine hours. Idle time on fire apparatus is incredibly high because of the number of non fire types of emergencies where apparatus is being used as a staff car to transport personnel to the scene of an emergency.

6 N/A

7 all of the above, mileage, service, repairs and there is a difference between type of apparatus.

8 Ambulances are replaced when they are near or over 120K, depending a lot on funding and condition of the truck

6. If you replace apparatus using a method other than age or mileage please

Response Text

1 it is a formula which takes into account Mileage, hours and repair cost

2 We replace on a few things. Number of breakdowns and service records. Mileage and age also factor into this.

3 We have a great maintenance program which allows us to get maximum use out of our apparatus.
We still like to change the equipment out on a 10 and 15 year schedule. This includes all loose equipment assigned to that apparatus.

4 As we can afford to replace them. Eventually it is too costly to keep some of our fleet on the road and as money is available we replace them.

5 n/a

6 We use mileage, idle hours, age, current function, technology needs and overall condition of the vehicle to determine its ability to achieve its mission. These indicators cause a closer annual look at the specific unit. Financial planning for replacement covers a window of time for the unit, not a specific drop dead year.

7 N/A
8 Actual replacement parameters are determined by Capital Improvement Plan and mechanical history. CIP is a 6/30 year plan that is updated annually.

9 Apparatus is based merely on an as need to basis meaning the truck is no longer serviceable.

7. How are the new apparatus funded?

Other (please specify)

1 I know it's a capital purchase or expense, but I think the city utilizes the bonds process for several capital items at once. For example, 1 fire truck, 6 police cars, 2 front end loaders, etc....

2 Bond sales

3 General obligation bond measure approved by voters, supplemented by some cash from reserves.

4 Combination of fund balance and financing.

5 a calculated amount figuring in inflation in set aside each year for each apparatus.

6 Capital Reserve Fund and Lease Purchase with lease costs coming from Capital Reserve.

7 We use a combination of existing funds, bonds and lease purchase to buy apparatus.

8 CDBG

9 Specific capital loan.

10 Capital purchase typically with bonds.

8. How do you dispose of apparatus once they have been replaced?

Comments

1 Sold outright using brokerage or classified ads.

2 We have actually done all three. We utilized a local municipal auction for a recent grass or brush truck, but for our larger apparatus, we have done both trade in and have sold the apparatus ourselves through a national advertisement. The trade in seamed to work better in my opinion.

3 We are without the exception rather than the rule relating to fleet purchasing. This is an experiment that to this point has been successful, has save funds and kept new technology in the hands of those who use it.
I saw your research paper relating to ISO and used it for a master plan recommendation just about 1 month ago. I cited and referenced your work so if you want more information, I certainly owe you one.

4 There are times when we negotiate a price with a private buyer as well as local auction.

5 use as spares when apparatus breakdown

6 Or sell to another department that shows interest.

7 We also advertise in various ways to sell surplused vehicles with a price identified by the Governing Board.

8 We recently sold an apparatus through a bid process to a volunteer department in the state, however as a general rule they are purchased by dealers.

9 Also have sold apparatus to the county's volunteer fire departments for $1 if they want the apparatus.

10 I am not sure what we do as a rule. We have sold thru magazine ads, and donated to other organizations like the school Fire and EMS programs!

11 Depends on the best deal.

12 Apparatus becomes reserve unit if possible.

13 We have done all of the above but sell on line.